

Cost Benefit Analysis

A CASE STUDY OF THE 5.9 GHZ BAND

PRESENTED TO
OEA, Federal Communications
Commission

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Agenda

- **Best Practices for Doing a Cost-Benefit Analysis (CBA)**
- **Application to 5.9 GHz Band**

Cost-Benefit Analysis

Best Practices for the FCC

Why Do a Cost-Benefit Analysis?

- All policies have trade-offs
- Understanding the economic trade-offs important information for policymakers
- CBA provides a structured way to think through and summarize the economic trade-offs embedded in any given policy proposal
- And everyone is doing them!
 - The scope of CBA for executive branch agencies has expanded vastly
 - CBA is foundational for evidence-based policy making

Guidance for CBA at the FCC

- The hard work of thinking through how to do CBA has already been done.
- The OMB (E.O. 12866, 1993; Circ A-4, 2003; Memorandum 2019) provides guidelines for Executive Branch Agencies.
- Those guidelines are widely praised and adopted.
 - General <https://www.foreffectivegov.org/node/3470>
 - Telecom <https://www.bloomberg.com/opinion/articles/2018-02-01/the-fcc-sees-the-value-of-cost-benefit-analysis>
 - Schools [https://www.maine.gov/doe/sites/maine.gov.doe/files/inlin e-files/indirect cost guidance.pdf](https://www.maine.gov/doe/sites/maine.gov.doe/files/inlin e-files/indirect_cost_guidance.pdf)
 - Transportation <https://cms.dot.gov/sites/dot.gov/files/docs/mission /office-policy/transportation-policy/284031/benefit-cost-analysis-guidance-2017.pdf>
- CBA guidelines for the FCC can leverage this good work.

When should the FCC perform CBA

- This is a purely policy question for the FCC.
- On the one hand, the information generated by a CBA is always useful to a policy maker.
- On the other hand, a properly done CBA takes time and resources.
- Even a partial CBA can still provide useful information.
- However, other considerations may guide the benefit of when to formally include a CBA in the policy making process at the FCC.

Elements of a Cost-Benefit Analysis

4 Step Process:

1. Select Baseline Specify the set of alternative actions and select an appropriate baseline;
2. Measure Costs and Benefits Relative to Baseline Properly measure all the economic costs and benefits relative to the baseline;
3. Choose a Discount Rate Express the undiscounted economic costs and benefits in a common monetary unit and discount them to a present value; and
4. Model Uncertainty Model uncertainty and perform sensitivity analysis.

Step 1: Selecting a Baseline

“[t]his baseline should be the best assessment of the way the world would look absent the proposed action” (OMB)

- Choice of the appropriate alternatives is also crucial to identifying a welfare-maximizing policy
- Considering the present scenario is not sufficient – need to account for future trends in the absence of intervention
 - Need to consider how the evolution of the particular segment will happen in the future
 - Changes to population need to be considered when estimating costs or benefits on a per-capita basis
- Need to choose several alternatives

Step 2: Measuring Economic Costs and Benefits

Opportunity costs and all externalities should be included

- Take into account all costs – especially opportunity cost
- Identify and estimate any negative externalities that may arise from the policy
- Take into account all benefits including any positive externalities

Step 3: Present Discounted Value

- Cost and benefits accrue at different times – usually costs are front loaded and benefits are back-loaded
- Bring all costs and benefits to one common monetary metric
- Choice of discount rate is crucial
- OMB requires that real discount rates of 3 and 7 percent should be used as a base-case for regulatory analysis
 - 3% rate is used to approximate the social rate of time preference for consumption
 - 7% rate is “an estimate of the average before-tax rate of return to private capital in the U.S. economy”

Step 4: Accounting for Uncertainty

- Use probability distributions of various alternative outcomes to capture the effect of uncertainty of costs and benefits
- If such probabilities are unavailable, perform sensitivity analysis to determine how sensitive outcomes are to changes in assumptions
- Even simply sizing the impact of uncertainty can be very useful information for policymakers

Road-bumps of Implementing a CBA at the Commission

- In the telecommunications sphere, benefits can be difficult to quantify
- Dynamic considerations – technology and market evolution – may be paramount, yet economics does not always have the tools to quantify such considerations
- The benefits are often very far into the future and with a fast changing technology landscape, sensitivity analysis increases in importance
- CBA should be adopted as a policy tool to implement the best policy alternatives that serve the public interest
- CBA Experience at the FCC

The Highest Value Use of the 5.9 GHz Band: ITS Versus Unlicensed Uses (WiFi)

20 Year Evolution of the 5.9GHz Policy

October 1999

FCC allocated 5.9 GHz band for “Intelligent Transportation Systems” (ITS) uses



February 2013

The FCC begins considering opening the 5.9 GHz band for unlicensed use.



August 2014

NHTSA proposed mandating a vehicle-to-vehicle (“V2V”) communication standard in the 5.9 GHz (“DSRC”).



June 2016

FCC issued a PN to refresh the record in the “Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band” proceeding



October 2018

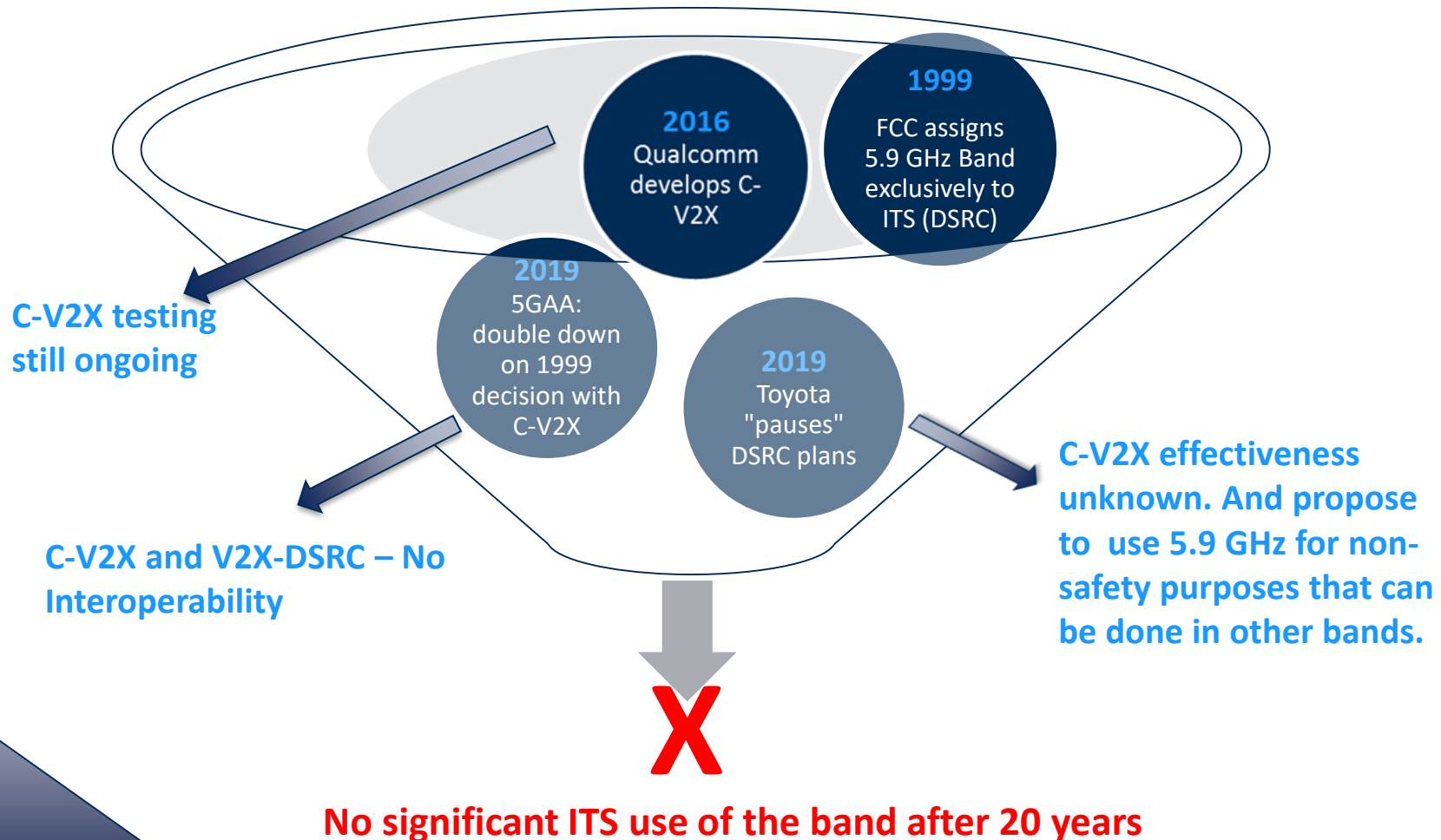
OET concluded that WiFi use of the 5.9 GHz band can occur without harmful interference



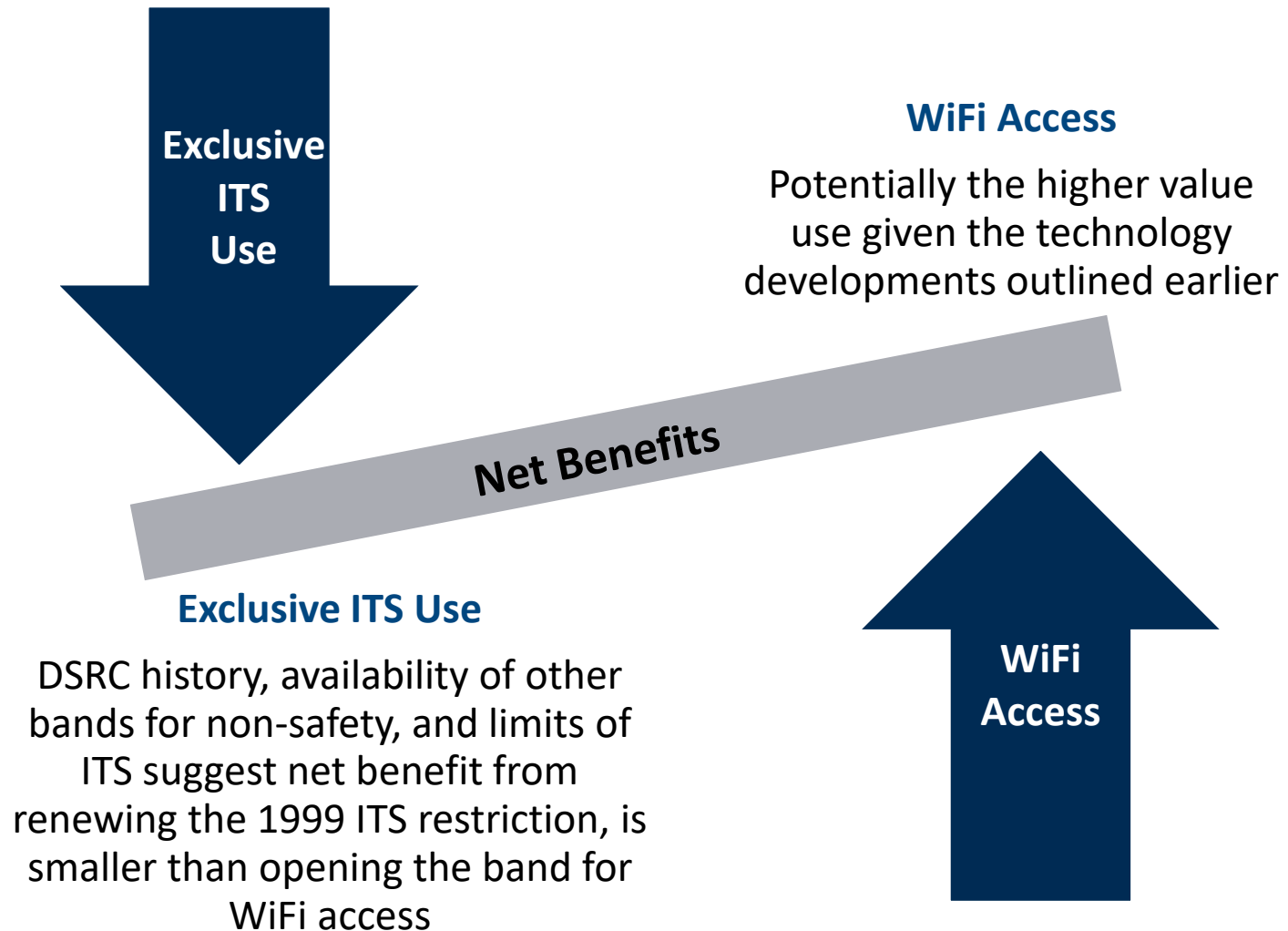
October 2018

NHTSA releases document about flexible use of the 5.9 GHz Band and recognizes technology neutrality

History of Vehicle Safety Technology in the 5.9 GHz Band



CBA to Evaluate Tradeoffs of Using 5.9 GHz for ITS versus Unlicensed Use



Cost-Benefit Analysis for 5.9 GHz

1. Select Baseline

- Should recognize that even without reserving the 5.9 GHz for ITS, vehicle-safety technology is going to improve in the next 40 years
- Recognize that there is no DSRC even after 20 years
- Need to choose appropriate baseline date (2019?)

2. Measure Costs and Benefits Relative to Baseline

- Account for the opportunity cost of spectrum if all 75 megahertz of the 5.9 GHz Band is dedicated exclusively for ITS
 - Lost value if none of the band is available for WiFi
 - Lost value if only a part of the band is available for WiFi
- Measure direct benefits
- Positive and negative externalities

3. Choose a Discount Rate

4. Model Uncertainty

- Account for factors that increase uncertainty, such as GPS limitations, security vulnerabilities, V2X self-interference, and equipment failure—all of which could decrease the value of dedicating 5.9 GHz for ITS

Comparison of Three Policies using CBA

1. Opening the full 75 megahertz of the 5.9 GHz Band for WiFi
 2. Splitting the 5.9 GHz Band between ITS and WiFi
 3. Reserving the full 75 megahertz of spectrum for exclusive ITS use
- Estimating the Value of Opening the Entire Band to WiFi
 - Measure the value of opening the entire 75 megahertz of spectrum in the 5.9 GHz band as the opportunity cost of not allowing WiFi devices to access the band (either in part or whole)
 - 5.9 GHz band very valuable for unlicensed WiFi

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